



Expose Yourself: Dynamic Pricing and Demand Response for Federal Facilities

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OUTLINE



- **Dynamic pricing defined**
- **Availability and advisability**
- **EX: Moorhead F.O.B., Pittsburgh, PA**
- **Demand response defined**
- **Overview of DR program types**
- **Key DR trends in U.S.**
- **Why federal participation has traditionally been low**
- **Positive signs for feds re DR**
- **Key take-aways**

- **Def.: Retail electric pricing that is responsive to changes in the wholesale markets, such as:**
 - Real-time pricing
 - Day-ahead pricing
 - “Block-and-swing” pricing
 - “Critical peak” or “peak day” pricing
- **Time-of-use is not considered a form of dynamic pricing b/c prices are fixed**
 - i.e., they’re not *directly* responsive to wholesale market gyrations

- **Maybe ...**
 - 15 states and DC are “deregulated,” i.e., they have true retail electric choice:
 - OR, TX, IL, MI, OH; whole northeast (MD to ME) except VT
- **But there are dynamic pricing options in parts or all of many other states, e.g.:**
 - WA, CA, AL, GA, NC, SC, MO, KS, OK
 - Most commonly, these are real-time/day-ahead or block-and-swing type tariffs
 - CA’s large customer default is “peak day” (PG&E) and “critical peak” (SCE and SDG&E) pricing

- **YES, it is ... but is that risk bad?**
 - Average savings over time, relative to locking in flat-priced power, is 5-10%
 - This translates to \$50-100K savings on a \$1M electric bill – and that assumes no change of use
 - If you can respond some to prices, the downside risk is minimized and savings increase
- **How much is budget certainty worth?**
 - Especially given that fed. gov't. (and even most agencies) have a diversified portfolio of facilities
 - This diversification means oddities in one area will be cancelled out by others, so only overall market risk remains
- **So why are fed. sites buying this insurance?**

- 785,000 sq. ft., Pittsburgh, PA
- Cooling: two 600-ton Trane centrifugal chillers
- Load response capability: 39 ice storage tanks with ~ 7,000 ton-hours of thermal energy storage (TES) capability
 - Maximum discharge rate (we think): ~ 1,000 tons (~ 25 tons per tank)



- 3rd-party supply contract for flat-priced electricity
- Ice storage operated as back-up if chiller went down and as supplement to cooling plant on summer days
 - Note: cooling with ice storage requires ~ 25% more energy than standard chiller operation
- Local utility had rate rider for ice storage but it offered little value and Moorhead wasn't on it
 - only allowed higher nighttime peaks (b/c of TES operation) to be overridden by facilities' daytime peaks
- TES's value: was likely reducing PJM's peak capacity charges some, but that benefit probably canceled out by higher overall cost to operate

- 3rd-party supply contract for electricity indexed to day-ahead PJM market
- Goal is to avoid PJM capacity charges (set by demand during five “peak load contribution” hours) and generally avoid high prices in PJM market
- Ice storage operated in one of three modes, depending on demand level in PJM territory (indicated by daily e-mail):
 - Green – melt runs throughout business day
 - Silver – melt runs 12-5, complemented by operation of one chiller, if needed
 - Gold – melt runs 1:30-5:00 at max discharge rate; chiller use avoided entirely

- **Savings: ~ \$235K over two years (> 14%) in savings relative to flat price option**
- **Energy Penalty?**
 - Likely some, b/c air conditioning with ice is 25% more energy-intensive
 - Unadjusted comparisons showed about 5-10% year-over-year increases in electricity from summer, 2007 to summer, 2008
 - Confounding variable is additional space that came on-line over this period

- **Def.: A short-term decrease in electrical consumption by end-use customers due to either increased electricity prices or incentive payments**
 - **Incentive payments could be triggered by high wholesale market prices or compromised grid reliability**
- **DR participation can be either through load curtailment (short-term conservation) or self-generation**

- **Reliability-based: “emergency” and “capacity” programs**
 - **Most common: “interruptible/curtailable” rates**
 - Oldest variety: sometimes called “active load management”
 - **Also includes direct load control**
 - **Program calls usu. require mandatory response**
- **Price-based: “economic” programs**
 - **Participation usually voluntary**
 - **Day-of and day-ahead options common**
 - **Demand bidding programs**

- **DR resource participation in capacity auctions**
 - Big opportunity in New England ISO and PJM
 - Attractive prices, usu. > \$40,000/MW
- **Automated DR (“Auto-DR”)**
 - Load drop or self-generation routine triggered automatically by external signal (e.g., XML)
 - Signal can indicate market price threshold (e.g., 25¢/kWh) or that utility is instigating DR event
- **FERC backing**
 - In rulings, e.g., that DR resources should be paid full “location marginal price”
 - In pushing regional transmission operator (RTO) model where central body runs grid and wholesale market

- **DR is growing in the U.S. and will continue to because it's getting:**
 - a) easier**
 - b) more lucrative**
- **Also, building power plants is getting more and more difficult (and expensive)**



Federal participation has traditionally been poor – why?



- **Classic “split incentive” problem**
 - Who benefits when fed. facility saves \$ w/ DR?
 - And can fed. facility even take the proceeds?
- **Lack of push in legislation or EOs**
 - EE & RE goals are strong, but DR/LM not addressed
- **Ignorance – partly due to two issues above**
 - “Our loads are flat so it doesn’t make sense”
 - “It’s too risky”
- **Variable returns, esp. w/ economic programs**
 - This hinders DR in guaranteed savings vehicles like ESPCs



However, things are looking up ...



- **DLA-Energy's "Master Agreements"**
 - Simplifies contracting with independent (non-utility) "curtailment service providers" (CSPs)
 - > 50 sites have signed up in less than three years
- **Legislative help (though only for DoD, for now)**
 - 2010 NDAA gave explicit okay to DoD facilities to contract with independent CSPs
- **Other good signs**
 - FERC is behind DR and ruling accordingly
 - FEMP's list of DR programs: www1.eere.energy.gov/femp/financing/energyincentiveprograms
 - Or navigate through "Project Funding" section of FEMP's site



Take-Aways



- **Dynamic pricing's risk can be a good thing!**
 - Risk has up side, too, esp. when you can hedge
 - And contracting for flat pricing (in dereg'd. states) is bad idea – don't pay for insurance policy
- **Numerous types of DR opportunities are available to federal customers**
 - Ranging from voluntary to mandatory programs
- **If you have *any* ability to respond, you should be taking advantage of one or the other**
 - And there are resources to help you, esp. FEMP and DLA